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January 29, 2015

Stuart Dearden

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55 Corporate Drive
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Re: Final Outfall 22B IRAM Performance Monitoring Sampling and Analysis Plan
RP-Portland Site
ECSI #155

Dear Mr. Dearden:

On November 14, 2014 the Department of Environmental Quality (DEQ) received a letter titled *Re: Response to Comments and Revised Draft Outfall 22B Sampling and Analysis Plan*, prepared by Golder Associates for StarLink Logistics Inc. (StarLink). The letter provided direct responses to DEQ's and EPA's comments on the *Draft Outfall 22B IRAM Performance Monitoring Sampling and Analysis Plan* (SAP) as well as an updated SAP.

In our December 4, 2014 letter to StarLink, DEQ determined that the revised SAP did not fully address DEQ's requested modifications. Therefore, consistent with Section 7.K(4) of the Consent Order, DEQ modified the document as outlined in our letter. DEQ has incorporated these modifications into a final document under DEQ letterhead. A redline version of the *Final Outfall 22B IRAM Performance Monitoring Sampling and Analysis Plan*, which highlights DEQ changes is attached for your records.

DEQ appreciates the effort made by StarLink to submit the *Revised Draft Outfall 22B Sampling and Analysis Plan*. Please feel free to contact me at 503 229-6748 if you have any questions.

Sincerely,

Scott Manzano, Project Manager
DEQ NWR Cleanup Program

Attachments: 1. Final Outfall 22B IRAM Performance Monitoring, Sampling and Analysis Plan, Former Rhone-Poulenc – Portland Site

C: *Joan Underwood, Quantum Management Group*
Jim Benedict, Cable, Huston, Benedict, Haagensen & Lloyd
Keith Johnson, DEQ
Rich Muza, EPA
Gary Vrooman, DOJ Natural Resources
ECSI #155

Attachment 1

Final Outfall 22B IRAM Performance Monitoring, Sampling and Analysis Plan, Former Rhone-Poulenc – Portland Site

Final Outfall 22B ~~E-IRAM~~ IRAM Performance Monitoring, Sampling and Analysis Plan, Former Rhone-Poulenc – Portland Site

February 2015

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DEQ is a leader in restoring, maintaining and enhancing the quality of Oregon's air, land and water.

State of Oregon
Department of Environmental Quality

Last Updated: xx/xx/xx

This report prepared by:

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Table of Contents

1. Objective

StarLink Logistics, Inc. (StarLink) completed the work for the Outfall 22B Expanded Interim Remedial Action Measure (E-IRAM). The E-IRAM Work Plan required the submittal of a Sampling and Analysis Plan (SAP) to provide data to evaluate whether the objective of the E-IRAM is achieved. This SAP describes the additional objective for the monitoring program requested by DEQ and describes the monitoring that will collect the data to evaluate the performance of the 22B E-IRAM ~~that repaired the City of Portland (City) Outfall 22B storm sewer system~~.

~~The objective of the original work plan for the E-IRAM was to minimize or eliminate discharge of RP-related constituents at Outfall 22B. An additional objective is to monitor and assess if the multi-source dry weather discharge from Outfall 22B poses a risk to the river. This SAP provides for observation and sampling of dry weather flow at Outfall 22B, observation and measurement of dry weather flow in manholes along the NW Front Avenue and collection of groundwater level measurements in selected monitoring wells within the Outfall 22B basin.~~

The Outfall 22B IRAM and Outfall 22B Expanded IRAM were implemented to address exceedances of JSCS SLVs for numerous Rhone Poulenc contaminants of interest in dry weather flow discharging from within the outfall piping and from water discharging outside the outfall piping. The objective of the performance monitoring is to demonstrate that the Outfall 22B stormwater system pathway is adequately addressed and does not pose an unacceptable risk to the river. Protectiveness will be assessed as follows:

1. Determine if dry weather flow is present
2. Determine if contaminants exceed JSCS SLVs
3. Evaluate if exceedances pose an unacceptable risk to the river
4. Determine if additional actions are needed.

2. Scope and Methodology

The Outfall 22B stormwater system consists of a City storm sewer along NW Front Avenue that discharges to the river upstream of the BNSF railroad bridge. Private laterals connect to the Outfall 22B stormwater system from Metro, MMGL (formerly Schnitzer)/Air-Liquide, Gould, and previously Arkema. The total length of the City and private Outfall 22B storm sewer is approximately 8,000 linear feet (see Figures 1 through 3 in AMEC 2009a).

Dry weather observations and if possible, flow measurements, will occur between City manhole MH-10 and Outfall 22B (Attachment A: Figure 1). Sampling will occur at the outfall. Monitoring will include measuring dry weather flow and sampling the Outfall 22B discharge. Groundwater levels will be measured at select wells adjacent to NW Front Avenue and on Metro property. Water level measurements will be compared to 22B pipe invert elevations and dry weather flow observations and measurements to evaluate whether groundwater levels influence the quantity and quality of dry weather flow.

Dry weather monitoring will be conducted at least 72 hours after a precipitation event. A precipitation event is measureable precipitation. The nearest rain gauge data (NW Yeon Avenue) will be evaluated to predict a 72-hour dry period to target for sampling. Seepage, if any, observed around the outfall discharge downstream from MH-3 will be photographed, documented in the field notes and in the quarterly or annual reports (per Section 3.0). If seepage is observed, sampling will be attempted.

Video logging will be completed every five years after ~~the expiration of the installation contractor's guarantee period for the E-IRAM~~ the first monitoring event until the Record of Decision (ROD) is issued for the site.

2.1 Groundwater Level Monitoring

Manual water level measurements will be recorded at shallow monitoring wells W-03-S, W-04-S, W-11-S, W-16-S, MW-15(S)-14 and ASW-05 shown in Figure 1 (Attachment A). Access to monitoring wells will be confirmed at least 30 days prior to a scheduled monitoring event. StarLink will request a waiver from the DEQ project manager from the requirement to monitor the well(s) for which no access has been granted. Field procedures for manual water level measurements are provided in Attachment B.

2.2 Flow Estimation

General observations of dry weather flow and flow measurements will be recorded in the field notes at City manholes MH-10, MH-9, MH-8, MH-7, MH-6, MH-4, and MH-3 and at Outfall 22B. Manhole MH-5 will not be monitored as the orientation of the structure is such that the manhole is not directly over the flow channel, making observations and measurements unfeasible. Approximate flow velocity will be measured with a Marsh McBirney flow meter or suitable area-velocity measuring device. Flow depth and width will be measured manually in the main flow channel of each manhole. Flow rate at each manhole will be estimated by manual measurement of flow depth, pipe diameter and flow velocity using the flow meter following by calculation of flow rate using standard conduit flow rate calculations. Discharge rate at the outfall will be measured with the flow meter. A bucket and stopwatch will be used if there is insufficient flow to use the flow meter.

2.3 Sample Collection

One water quality sample and one field replicate will be collected of Outfall 22B discharge during each monitoring event, if discharge is present. The sample will be collected following methodology described in Surface Water Sampling SOP-10 (Attachment B) and submitted for laboratory analysis of the constituent groups and analyses listed in Table 1 (Attachment C). ~~Sampling will only be conducted when the outfall is clear of debris, sufficient free-flowing discharge can be sampled during the sample event and turbidity at the time of sampling is less than 10 ntu (to prevent collection of dislodged sediment within the conveyance system).~~ Sampling will be conducted when the outfall is clear of debris and sufficient free-flowing discharge can be sampled during each event. If equipment is necessary to clear the debris, StarLink will work with the City and DEQ to determine how to clear the debris and timing. Outfall clearance will be confirmed by StarLink one month prior to planned sampling.

The small distance (approximately 1”) between the lip of the outfall and the receiving concrete swale and the low flow rate expected to be encountered at the time of sampling does not allow for typical sized sample containers to be lowered directly into the flow for sampling. Samples will be collected by lowering a disposable, clean, wide-mouth glass jar (dipper) into the outfall discharge and filling the dipper as practicable. The sample will then be transferred to the respective unpreserved or preserved sample containers with care and minimal sample disturbance. Dissolved metals samples will be collected using a peristaltic pump and clean tubing to transfer the sample from the dipper through a clean, disposable 0.45 micron filter to the appropriate sample container.

Sample containers will be labeled with sample identification, time, and date. An outfall sampling worksheet will be completed at the time of sampling (Attachment D). Samples will be packaged for shipment in a cooler with ice and be accompanied by a chain-of-custody tracking form. A trip blank will also be stored and transported in the cooler containing samples collected for VOC analysis per Table 1 (Attachment C). Samples will be delivered directly under chain-of-custody to a qualified laboratory or their representative within applicable holding times.

Water quality parameters including pH, specific conductance, dissolved oxygen, oxidation-reduction potential, temperature, and turbidity will be measured in the field upon completion of sample collection. If flow is not deep enough to lower the multi-parameter probe directly into the flow, outfall discharge will be collected and measured in a dipper.

Decontamination of monitoring and sampling equipment will be conducted per SOP-3 (Attachment B). Waste generated during sampling and monitoring activities will be handled and documented as described in SOP-13 (Attachment B).

Samples at individual manholes may be taken depending on sampling results and data evaluation as described in Section 3.2. SOP-10 (Attachment B) provides a description of sampling procedures in manholes.

2.4 Quality Assurance/Quality Control

Sample integrity and quality control will be maintained and met by following the Quality Assurance Project Plan 2009 Update (QAPP) produced by AMEC Earth & Environmental, Inc. for the RP – Portland Site and submitted to DEQ on September 16, 2009 (AMEC 2009b).

Field quality control sample collection and analysis will include the following:

- Trip blanks – one trip blank per cooler containing VOC samples
- Rinsate blanks – one per day per matrix when non-dedicated equipment is used and one per bath of in-line water filters (inorganics only)
- Field replicate – one field replicate for all parameters per sample event
- MS/MSD – sufficient sample will be collected for the laboratory to run MS/MSD analyses within the sample batch

Requirements for sample containers, volumes, preservation, and hold times are included in Table 4 of the QAPP (AMEC 2009b). Method detection and reporting limits are provided in Attachment C – Table 2.

Field water quality meters will be calibrated at the beginning of the day and results will be documented in the field logbook. Observation of field conditions will be collected during the monitoring event.

3. Scheduling, Evaluation and Reporting

3.1 Monitoring Schedule

Dry weather monitoring will be conducted quarterly during the first two years and annually thereafter until the ROD is issued for the site. The search for a dry weather flow sampling period will begin once 1) the SAP is approved, 2) a City permit has been obtained and 3) access agreements (dependent on an approved work plan) are in-place or a waiver for monitoring is obtained from DEQ if access agreements have not been obtained. The first month of each quarter will be targeted for sampling but will be dependent on observation of a 72-hour dry period prior to initiating sampling. Annual monitoring will be conducted in the spring of each year (March through May) to reflect high groundwater conditions, so that the targeted quarterly monitoring months will be January, April, July and October and the targeted annual monitoring month will be April.

DEQ will be notified one week before observation for a 72-hour dry period begins. Since sampling requires a minimum 72-hour dry period prior to each monitoring event, scheduled sampling will also be confirmed with DEQ the day prior to the anticipated sampling. However, if no 72-hour dry period occurs during the quarter, the monitoring will be conducted after the first available 72-hour dry period after the quarter.

3.2 Data Evaluation and Additional Sampling

Data evaluations described below will be conducted after receipt and validation of laboratory analytical results.

- Groundwater elevation data will be tabulated and compared to historical elevation data and to the nearest pipe invert elevations to assess sewer line sections that are below the water table
- Dry weather analytical results will be compared to the following:

- SLVs (see Attachment C – Table J-1)
- Historical (i.e., pre-IRAM) dry-weather (non-stormwater) analytical results for samples collected from Outfall 22B
- Other data sets as appropriate, including but not limited to historical stormwater and non-stormwater analytical results for nearby properties and sites
- Groundwater analytical data

Detection of one or more constituents at concentrations above SLVs in dry-weather flow samples does not mean that the discharge of dry-weather flow to the river causes or contributes to unacceptable risk to human health or the environment. Consistent with DEQ guidance (DEQ, 2010), other lines of evidence may be used to evaluate whether detected constituent concentrations above SLVs, if any, pose an unacceptable risk to human health and the environment. Other lines of evidence may include, but not be limited to, discharge volume, constituent concentration and initial dilution and mixing in the receiving stream and the potential for recontamination based on the presence of sediment in the discharge.

If one or more organic constituents are detected at a concentration above their respective SLV~~ and it is identified as posing an unacceptable risk to human health and the environment, and the source of the constituent(s) cannot be identified through the evaluations described above~~, additional sampling~~, including, but not limited to sampling~~ at individual manholes MH-10, MH-9, MH-8, MH-7, MH-6, MH-5, MH-4, MH-3, and Manhole 9 on Metro property, ~~may be~~ will be required. Additional sampling may be proposed by StarLink. Sampling will be conducted at individual manholes if the following conditions are met:

- Dry-weather sampling conditions are met (72-hour period of no detectable precipitation) and
- Sufficient flow is present at manholes MH-10, MH-9, MH-8, MH-7, MH-6, MH-5, MH-4 and MH-3 as well as Manhole 9 on Metro property, in order to obtain representative samples for the ~~target~~ analytical suite~~s (where SLVs are exceeded)~~.

Performance of the IRAM will be based on the full suite of analytes as presented in Attachment A Table 1 of the SAP. StarLink may request a reduction in the suite of analytes based on the results of the first two years of monitoring.

There are multiple potential third-party sources of constituents to Outfall 22B that can impact dry-weather flow sampling results including non-stormwater, stormwater and sediment carried with stormwater or groundwater flow from:

- Arkema
- NL/Gould
- MMGL (formerly Schnitzer)/Air Liquide
- ESCO
- Metro
- BNSF
- Dredge spoils placed near and adjacent to Outfall 22B prior to and during the construction of Outfall 22B
- Urban run-off from Highway 30, North Front Avenue, and other areas
- Precipitation

Past monitoring has not identified the source of flow, sediments or observed constituent impacts within the Outfall 22B storm sewer. Determining the source of any constituents detected in dry weather (non-stormwater) samples collected from the Outfall 22B storm sewer may not be possible, even with additional sampling at individual manholes.

3.3 Reporting

A performance monitoring report will be prepared within 30 days of the monitoring event (if no samples were collected) or within 30 days from receipt of laboratory data if samples were collected and analyzed. The report will be stamped by a licensed professional and will include the following information:

- Introduction/Background
- Summary of monitoring event actions including precipitation information to document conditions prior to a monitoring event
- Summary of field observations
- Deviations from the SAP
- Summary tables of validated analytical results with comparison to site-specific SLVs other data sets as described in Section 3.2
- Field notes (provided in an attachment)
- Laboratory data sheets (provided in an attachment)
- Analytical data validation report (provided in an attachment)
- Comparison of observed groundwater levels to invert elevations (Table 16, AMEC, 2008) with the inclusion of Metro stormwater system invert elevations near monitoring wells W-15-S(15) and ASW-05.
- ~~An evaluation and conclusion on whether the dry-weather discharge poses a risk to the river and a recommendation on whether manhole sampling is proposed if a constituent is above a site-specific SLV.~~ Conclusions/Recommendations regarding the adequacy of the IRAM in eliminating the Basin 22B groundwater infiltration pathway, and if additional work/repair is needed at the time of the report.

At the completion of the two-year period of quarterly monitoring events a report will be prepared including an evaluation of data trends, conclusions, and recommendations regarding the performance of the ~~E-IRAM~~ IRAM.

4.0 References

AMEC 2008. Outfall 22B Interim Remedial Action Measure Technical Memorandum RP-Portland Site. Submitted to the Oregon Department of Environmental Quality. Prepared for SLLI. May 1, 2008.

AMEC 2009a. Draft Outfall 22B Expanded Interim Remedial Action Measure Work Plan RP - Portland Site. Submitted to the Oregon Department of Environmental Quality. Prepared for SLLI. April 6, 2009.

AMEC 2009b. Quality Assurance Project Plan 2009 Update Remedial Investigation Activities RP - Portland Site. Submitted to the Oregon Department of Environmental Quality. Prepared for SLLI. September 16, 2009.

DEQ 2010, Guidance for Evaluating the Stormwater Pathway at Upland Sites. Oregon Department of Environmental Quality, Environmental Cleanup Program, Portland, Oregon. Updated October 2010.

5. Attachments

The following are included as attachments to this SAP.

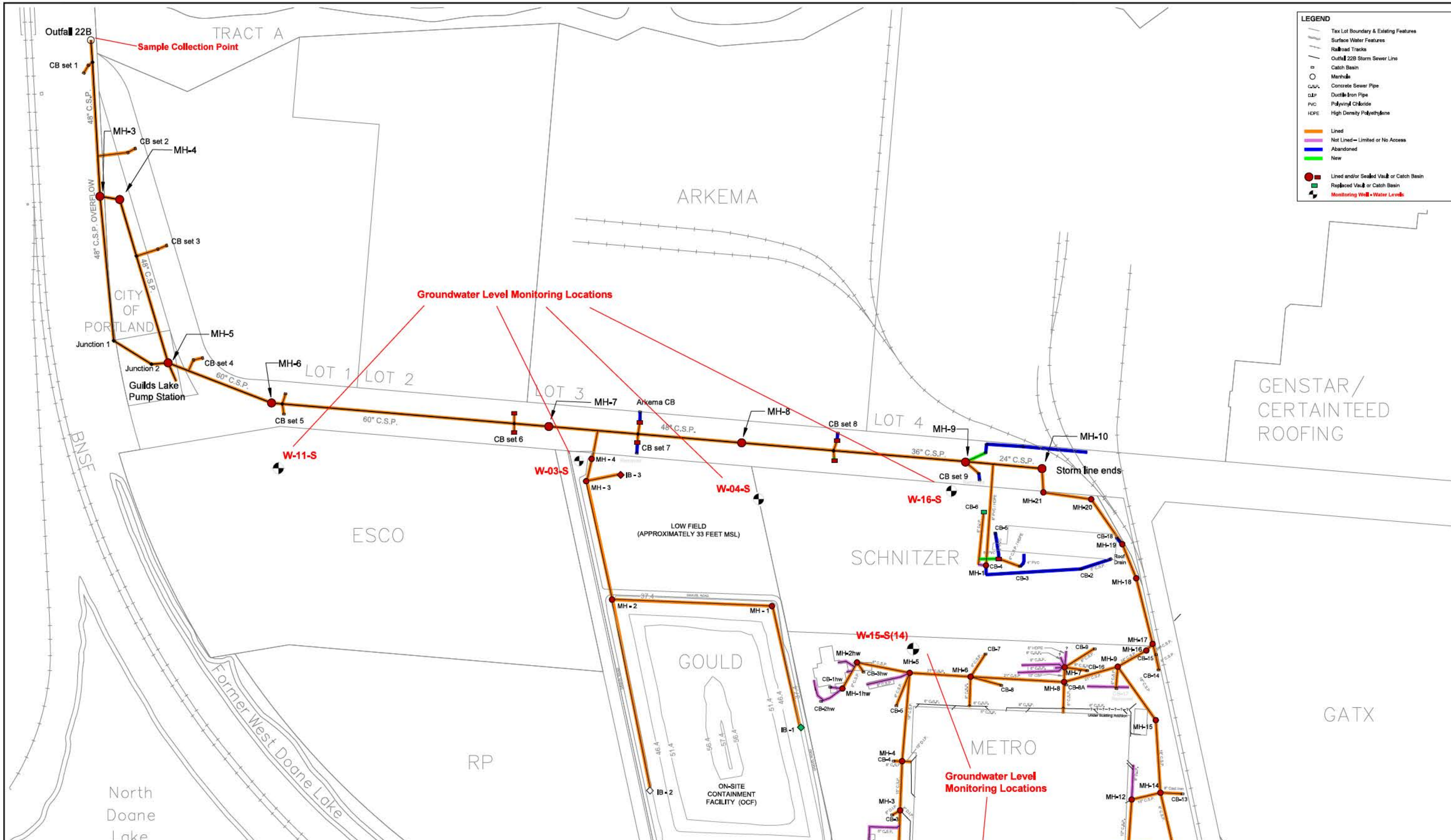
Attachment A:	Figure 1 - Outfall 22B Storm Sewer System, Lining and Repairs Completed, (showing monitoring locations)
Attachment B:	Standard Operating Procedures (SOPs)
Attachment C:	Table 1 – List of Analyses

Table 2 – Method Detection and Reporting Limits

Table J-1 – TABLE J-1 REVISED (4/29/14) Screening Level Values for Constituents Detected in Groundwater and Surface Water Samples

Attachment D: Outfall Sampling Worksheet

ATTACHMENT A
FIGURE



(Source: Completion Documentation, Outfall 22B Storm Sewer Expanded IRAM, August 22, 2014)

Sewer lines, catch basins, and manholes locations on Front Avenue determined from City of Portland GIS files obtained March 7, 2006

Sewer lines, catch basins, and manholes locations on Metro determined from Metro East Transfer Stations Phase II B: Utilities, Storm Sewer Plan A & B and Liquid Air Building Storm Sewer Alignment figures, and GPS survey of some features by AMEC on January 22, 2009.

Sewer line, catch basin, and manhole locations on Schnitzer property determined from City of Portland Plumbing Division permit dated 10/23/2000, Acetylene Plant Storm Water Pollution Prevention Plan dated November 2007 from the Bureau of Environmental Services, and information obtained and observations made during completion of IRAM work.

Golder Associates

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DRAWN BY:
QC BY:
DATE DRAWN:
DATUM / PROJECTION: NAD83 / OR SP N Int Ft
PROJECT NO:

TITLE: Figure 1
Outfall 22B Monitoring Locations

REPORT: Outfall 22B IRAM Performance Monitoring Sampling and Analysis Plan

ATTACHMENT B
STANDARD OPERATING PROCEDURES (SOPs)

RP - PORTLAND SITE
SOP - 1
METHODOLOGY FOR WATER LEVEL DETERMINATION

1.0 PURPOSE

Depth to water measurements are used to compute groundwater elevations. Water levels may be collected manually with an electronic water level probe or automatically with a pressure transducer and associated datalogger. This standard operating procedure (SOP) is specific to manual water level determination. Manual water level readings are the most common type of water level determination. Generally, this method is used if continuous water level data are not required, and at wells where non-aqueous phase liquid (NAPL) is suspected or present.

2.0 EQUIPMENT LIST

1) Photo-ionization detector (PID) for environmental sites
2) Well lock keys
3) Blank Water Level and NAPL Thickness Measurement Form, other site-specific form, and/or field logbook with indelible pens
4) Electronic water level probe
5) If NAPL is expected, interface probe and check-valve Teflon bailer with new cord
6) Knife or scissors
7) Decontamination equipment (see SOP - 3 Decontamination Procedure and sampling plan for additional site-specific requirements)
8) Site map and site health and safety plan (HASP)
9) PPE appropriate for site (see HASP if applicable)

3.0 PROCEDURE

Depth to groundwater and total well depth measurements will be made with an electronic well sounding (water level) probe. This probe is capable of measuring the depth from the top of the well casing to the nearest 0.01 foot.

1) Measurements are taken from cleanest to most heavily impacted wells, based on historic data where available.
2) Check well for security damage or evidence of tampering and record pertinent observations. Note any maintenance tasks that should be completed, such as well cap or padlock replacement.

3) Unlock and remove the cap from the well casing, allowing the pressure to equalize in well.

4) At sites with suspected environmental contamination, after removing the well cap immediately measure the air space in the well bore for the presence of volatile organic compound (VOC) vapors using a PID. The PID reading will aid in the determination of the appropriate level of personal protective equipment (PPE) at each well.

5) For wells where NAPL is not suspected, the water level probe sensor head is lowered into the well opening until an auditory or visual signal is obtained. The sensor is slightly raised and lowered to determine the strongest signal, indicating the top of the water level surface in the well casing. For wells where NAPL is suspected, use an interface probe and follow probe instructions to determine the type of signal for water versus product.

6) The measurement is read off the tape at the point that corresponds to the survey mark on top of the well casing and recorded on the Water Level and NAPL Thickness Measurement Form, other site-specific form, or the field logbook to nearest the 0.01 foot. The depth to fluid is measured from an established point on the well casing and is later subtracted from the elevation of that mark to calculate groundwater (or product) elevation at the well location. Record both depth to NAPL and depth to water, where applicable.

7) Measure a total depth of the well to the nearest 0.1-foot. If the well is deeper than 100 feet (the typical length of water level probes), a weighted tape may be used to determine total well depth. If free-phase product is suspected, use the interface probe to check for the possible presence of dense NAPL (DNAPL) near the well bottom.

8) Decontaminate the exposed tape and water level or interface probe sensor head prior to rolling it onto the equipment reel.

9) For wells with known NAPL or where evidence of NAPL is observed on the water level probe, a disposable, weighted bailer will be used to determine whether NAPL is present. If present, visually examine the NAPL for color, background odor, evidence of NAPL product sheen or droplets, etc. Record these observations and a NAPL thickness corresponding to the thickness observed in the bailer on the Water Level and NAPL Thickness Measurement Form, other site-specific form, or field logbook.

10) Contain and dispose of PPE, bailer and cord (if used), and decontamination water according to site-specific requirements.

RP - PORTLAND SITE
SOP - 3
DECONTAMINATION PROCEDURE

1.0 PURPOSE

Decontamination of non-disposable equipment is performed at sites where environmental contamination is known or suspected. This is done to minimize the potential for cross-contamination between sampling locations (potentially resulting in unrepresentative samples and/or causing the spread of contamination) and also to protect human health and safety.

2.0 EQUIPMENT LIST

1) Deionized water
2) Plastic buckets
3) Spray bottles
4) Disposable rags or paper towels
5) Alconox, methanol, hexane
6) Potable water (can be replaced by deionized water)
7) Site map and site health and safety plan (HASP)
8) PPE appropriate for site (see HASP if applicable)

3.0 PROCEDURE

Sampling equipment (e.g., water samplers, flow cells, pumps, water level meter, etc.) will be decontaminated as follows:

1) Soap wash (dilute solution of Alconox or equivalent in potable water solution);
2) Potable water rinse;
3) Solvent rinse (methanol, hexane, or similar); and
4) Distilled/deionized water rinse.

If non-aqueous-phase liquid (NAPL) is encountered, probes and sounding tape will be wiped with a solvent-soaked towel during retrieval, and the equipment will be decontaminated with a solvent rinse as described above. For locations with NAPL or suspected NAPL, the sampling equipment used will be washed with hexane prior to the soap wash.

Decontamination fluids will be stored in an appropriately labeled tank and transported from the generation point to the RP wastewater treatment system for discharge in accordance with the NPDES permit modification granted to RP on September 20, 1999. This will occur on the day of generation. All decontamination fluids will be discharged to the RP wastewater treatment system because both hazardous and non-hazardous waste can be disposed of in the RP wastewater treatment system. The quantity of water discharged to the RP wastewater treatment system will be recorded on the 90-Day Investigation Derived Waste Log.

RP - PORTLAND SITE
SOP - 10
SURFACE WATER SAMPLING METHODOLOGY

1.0 PURPOSE

Surface water samples are often collected for observation and analysis to determine the chemical and physical characteristics of the surface water at a given location. Surface water samples can be collected from streams, rivers, channels, sewers, ponds, lakes, lagoons, or any other accessible surface water body. Several sampling methods can be employed depending on access, level of anticipated contamination, depth of water, and other considerations.

2.0 EQUIPMENT LIST

1) Sampling equipment (see descriptions below)
2) Photoionization detector (PID) for environmental sites
3) Access keys or tools
4) Appropriate field sampling form and/or field logbook with indelible pens
5) Knife or scissors
6) Safety equipment (e.g., harness), as appropriate
7) Decontamination equipment (see SOP - 3 Decontamination Procedure and sampling plan for additional site-specific requirements)
8) Site map and site health and safety plan (HASP), if applicable
9) PPE appropriate for site (see HASP if applicable)

3.0 PROCEDURE

The collection of samples from surface water bodies presents unique challenges. The sampling can be easy and routine such as collecting a surface water sample from a two-foot deep stream or may dictate special equipment to access the sample (wide streams with a high flow rate or tidal channels). Health and safety should be a major consideration in selecting an appropriate sampling method. Each person on a barge or in a boat in water above the sampler's wrist must be equipped with a life preserver and/or lifeline. When collecting samples from a fast moving stream, the person collecting the sample should be fitted with a safety harness and lifeline.

Prior to sample collection, the water body characteristics (size, depth, flow) should be recorded in the field logbook. Sampling should proceed from downstream to upstream locations to minimize the disturbance that would affect sample quality. If sediment samples are collected at the same location as the surface water sample, the surface water sample must be collected first. When wading in a stream or pond, care must be taken not to collect the water sample where bottom sediments have been disturbed.

The factors that should be considered when selecting a sampling method include width, depth and flow of the location being sampled, and whether the sample will be collected from the shore or a vessel. Surface water samples can be accomplished by using the following samplers:

- Laboratory cleaned sample bottle;
- Disposable dippers;
- Subsurface bottle samplers;
- Stainless steel, discrete interval bomb samplers;
- Kemmerer depth sampler;
- Horizontal water bottle samplers; or
- Peristaltic pump.

Samples collected near the surface can be collected directly into the laboratory cleaned sample bottle or with a dipper. In situations where the water cannot be reached, the sample container can be attached to an extension. A subsurface bottle sampler or disposable dippers also can be used for this application.

For stratified water columns in ponds and lakes, it may be necessary to collect a water sample at depth, beneath the surface of the water. A depth sampler such as a Kemmerer depth sampler, sub surface bottle sampler, bomb sampler or horizontal water bottle samplers would allow collection of discrete water samples at various depths.

Dippers

Dippers allow remote sampling of ponds, streams, and manholes from hard to reach areas. A dipper is simply a bottle attached to an extension that is immersed into a liquid to collect a sample (Figure 1). Disposable dippers can be used to eliminate problems associated with decontamination and cross contamination of samples. Some dipper samplers are equipped with a pivoting head to sample in hard to reach areas such as sewers or outflow pipes.

Figure 1. Polyethylene Disposable Dipper

Subsurface Bottle Samplers

These samplers (also called Wheaton Dip Sampler) consist of a glass bottle mounted on a metal pole of fixed length (Figure 2). An extension allows the bottle to be opened and closed under water for discrete sampling.

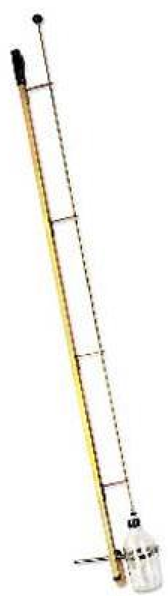

Figure 2. Sub Surface Grab Sampler

The procedure for sampling is as follows:

1) Prior to use test the sampler several times in a bucket of clean water to ensure proper adjustment.
2) Submerge sampler into liquid to be sampled.
3) When desired depth is reached open the sample bottle by pulling extension. Some samplers use a remote valve that can be opened and closed by pulling and releasing a ring on the handle.
4) The bottle is full when air bottles no longer escape to the surface.
5) Close the sample bottle by pushing the extension (or releasing the ring).

6) Transfer sample to the appropriate laboratory cleaned sample container.

Bomb Samplers

The bomb sampler is useful for collecting samples at various vertical locations in a water column (Figure 3). The sampler can be filled when contact is made with a hard surface or by pulling up on a separate line to a trigger at a desired depth. Retrieving the sampler or releasing the pull line reseals the sampler. This sampler would generally be operated from a boat or dock.

Figure 3. Stainless Steel Bomb Sampler

The procedure for use is as follows:

1) Lower the bomb sampler carefully to the desired depth, allowing the line for trigger to remain slack at all times.
2) When the desired depth is reached, pull the trigger line until taut.
3) Release the trigger line and retrieve the sampler.
4) Transfer the sample to the appropriate sample container by pulling the trigger.

Kemmerer Sampler

As with the bomb sampler, the Kemmerer sampler is useful to collect water samples from various depths in a water column. The Kemmerer sampler would generally be operated from a boat or dock. The sampling device consists of an open tube with two sealing end pieces. These end pieces can be withdrawn from the tube and set in the open position. These remain in the open position until the sampler is at the desired depth and then a weighted messenger is sent down the line or cable, releasing the end pieces and trapping the sample in the tube. The sampling tube is exposed to material while travelling down to the sampling the depth, which in some conditions in a stratified water column may cross contaminate the sample.

Figure 4. Kemmerer plastic bottle sampler.

Procedure for use:

1) Set the sampling device so that the sealing end pieces are pulled away from the sampling tube, allowing the water to pass through the tube.
2) Lower the pre-set sampling device to the desire depth.
3) Send down the messenger, closing the sampling device.
4) Retrieve the sampler.
5) Transfer the sample to the appropriate sample container.

Peristaltic Pump

A peristaltic pump can be used to collect a surface water sample from below the water surface of a lake or pond. The intake tubing can be place at place at a discrete depth below the water body surface. The sample should be collected at flow rate less than 400 milliliters per minute.

Procedures of use:

1) Place the appropriate flexible tubing in the peristaltic pump head.
2) Use dedicated disposable tubing for the intake and discharge tubing.

3) Place intake tubing a sampling depth. Use a buoy or anchor rope to hold the tubing in place while sampling.

4) Collect the sample a low flow rate (50 to 400 milliliters per minute).

RP - PORTLAND SITE
SOP - 11
FIELD PARAMETER MEASUREMENT FOR SURFACE WATER AND OUTFALL DISCHARGE SAMPLING

1.0 PURPOSE

Measurements of pH, oxidation-reduction potential (ORP), air and water temperature, conductivity, tubidity, and dissolved oxygen (DO) concentrations will be obtained with calibrated instruments at all sample sites prior to sample collection. At some locations ferrous iron also may be included.

2.0 EQUIPMENT LIST

1) Portable, battery-powered multiprobe equipment (e.g., YSI 650 MDS or YSI 610) with calibration solutions and instructions
2) Turbidity meter
3) Ferrous iron field test kit, stocked with reagents
4) Appropriate field forms for recording readings and/or field logbook with indelible pens
5) Knife or scissors
6) Decontamination equipment (see SOP - 3 Decontamination Procedure and sampling plan for additional site-specific requirements)
7) Site map and site health and safety plan (HASP), if applicable
8) PPE appropriate for site (see HASP if applicable)

3.0 PROCEDURE

Procedures for collection of specific field parameters are provided in the sections below.

Temperature, pH, Specific Conductance, DO, and ORP

Field measurements for temperature, pH, specific conductance, DO, and ORP will be measured with portable, battery-powered instruments (e.g., YSI 650 MDS or YSI 610 D multiprobes). Procedures for calibration and measurements are outlined in the user manuals included with these instruments. At a minimum, these instruments will be calibrated each day before sampling activities begin. If possible, these field parameters will be measured directly by lowering the probe into the water body at the sampling location prior to collecting the water and sediment sample. The probe will be decontaminated between measurements as outlined in SOP - 3.

Measurements for Turbidity

Turbidity will be measured once per sample immediately prior to filling sample bottles. Turbidity will be measured using appropriate portable, battery-powered field equipment and results will be recorded in nephelometric turbidity units (NTU). Dilution of the sample may be required for water with high turbidity.

Ferrous Iron (Fe2+)

Field measurement of ferrous iron (Fe2+) will be conducted using a colormetric technique. Summary of procedures for Fe2+ measurement:

1) Wash all lab ware between tests with a non-abrasive detergent or solvent. Do not use paper towels on the plastic tubes, as this may scratch them.
2) Rinse all tubes thoroughly with the sample water prior to testing.
3) Fill a viewing tube to the first 5-millitier (mL) line to be used as a blank.
4) Place the blank tube in the top left opening of the color comparator.
5) Fill the measuring vial to the 25-mL mark with the sample water.
6) Use the supplied clippers to open the powder pillow.
7) Add the contents of the powder pillow to the measuring vial.
8) Swirl to mix and allow three (3) minutes for full color development. An orange color will develop if Fe2+ is present.
9) Fill a second viewing tube with the prepared sample from the measuring vial to the first 5-mL mark.
10) Place the second tube in the top right opening of the color comparator.
11) Hold the comparator up to a light source and rotate the color disk until the color matches in the two openings.
12) Read the mg/L Fe2+ result in the scale window.
13) Place the tested water into the container of Investigation Derived Waste (IDW) and rinse the viewing tubes and the measuring vial.

RP - PORTLAND SITE
SOP - 13
WASTE MANAGEMENT PROCEDURES

1.0 PURPOSE

To promote proper and consistent handling, storage, and disposal of waste generated during field investigations to prevent or minimize the potential for the spread of contamination, creation of sanitary hazards, or visual degradation of the RP site through the spread of litter.

2.0 EQUIPMENT LIST

1) Site health and safety plan (HASP), including site map
2) Personal Protective Equipment (PPE) appropriate for site (see HASP)
3) 90-Day Investigation Derived Waste Log form (attached)
4) Daily Water Disposal Log form (attached)
5) Field logbook
6) Waste labels
7) Indelible pens
8) Heavy duty plastic sacks
9) Portable water storage tank
10) Department of Transportation (DOT) approved removable head 55-gallon steel drums
11) As appropriate for work involving non-aqueous phase liquid (NAPL), on-site chemical-resistant container with secondary containment (e.g., 30-gallon, Teflon-bonded, hard-top steel drum with volumetric gauge contained with secondary containment and cover, and large dedicated funnel)
12) As appropriate for work involving NAPL, portable chemical-resistant container with secondary containment (e.g., 3-gallon Teflon-bonded steel container within 5-gallon bucket)
13) As appropriate for oversight of waste transport, manifest forms (hazardous and/or non-hazardous)

3.0 PROCEDURES

Wastes generated during field investigations may include decontamination water, PPE, disposable sampling equipment, NAPL, and/or other hazardous and non-hazardous wastes. Waste water will be discharged to the on-site wastewater treatment system, as described below. Solid waste and NAPL will be stored in the RP property waste storage facility pending disposal, as described below.

Containers of waste in the RP waste storage facility should not be opened without knowledge of contents and use of appropriate personal protective equipment (PPE). Reference the project HASP for specific procedures and protections to be implemented during waste handling and inventory.

Collection, Documentation, and Storage of Solid Waste

Personal Protective Equipment (PPE)

All disposable health and safety PPE (Tyvek® suits, gloves, etc.) will be collected and stored in heavy duty plastic sacks and transported to the RP waste storage facility on the same day it was generated. The sacks with discarded PPE will be placed in DOT-approved removable head steel drums.

Disposable Sampling Equipment

All disposable sampling equipment (disposable bailers, plastic tubing, etc.) will be collected and stored in heavy duty plastic sacks and transported to the RP waste storage facility on the same day it was generated. The sacks will be placed in DOT-approved removable head steel drums.

Non-Hazardous Wastes

Non-hazardous wastes that may be generated during field activities include paper, food containers and wrapping, aluminum cans, bottles, plastic bags, and other miscellaneous types of debris. This material will be contained in plastic refuse sacks for disposal in approved waste receptacles (dumpsters). Disposal will occur daily.

Collection, Documentation, and Disposal of Waste Water

All decontamination fluids and purge water from well sampling and/or development, will be contained in an appropriately labeled portable tank located on the back of a field truck for transport to the RP property.

Decontamination and well purge water will be evacuated from the portable water tank using the sump pump assembly available at the RP wastewater treatment system. Transport to the RP property and discharge to the treatment system will occur on the day of generation. The quantity of water discharged to the RP wastewater treatment system will be recorded on the Daily Water Disposal Log, attached.

Collection, Documentation, and Storage of NAPL or NAPL/Fluid Mixtures

NAPL and NAPL/fluid mixtures generated during field events where NAPL is intentionally removed from wells will be placed in a portable, chemical-resistant container with secondary containment for transportation from the well to the RP waste storage facility. The contents of the portable container will be transferred to a stationary chemical-resistant container with secondary containment by discharging the fluid through a dedicated, industrial-sized funnel with a flip-top reclosable lid to eliminate splashing and spills. Appropriate PPE, consistent with or more protective than that used for NAPL collection, will be worn during transfer of NAPL from the portable container to the stationary container. Transport of NAPL from the collection site and transfer into the stationary container will occur on the day of generation.

The total quantity of NAPL and NAPL/fluid mixture removed, expected to be quarts per well, during each day will be recorded on the 90-Day Investigation Derived Waste Log (attached).

Temporary Container Labelling

All containers of waste generated during field investigations will be labeled with information appropriate for accurate tracking and identification of the containers and their contents. The labels will be waterproof markings or adhesive labels applied on both sides and the lids of each 55-gallon drum or container.

Drums will be labeled with the following information:

RP ACTIVITY (i.e., RI/FS) WASTE TYPE (i.e., Investigation-Derived Waste (IDW))

HOLD FOR ANALYSIS

DATE FIRST ACCUMULATED (example: March 18, 2002)

STATION IDENTIFIER (example: NDL-102-S)

TYPE OF WASTE/MEDIA (example: disposable poly-sleeve/soil)

Each container will be assigned a unique identification number and will be logged onto the 90-Day Investigation Derived Waste Log, attached. Wastes will be categorized and containerized based on media type and waste stream. Following waste determination, these temporary markings will be removed and each container will be labeled with an appropriate hazardous or non-hazardous waste label.

SOIL AND PPE/DEBRIS
90-DAY INVESTIGATION DERIVED WASTE LOG
RI/FS
RP - Portland Site

Container Number	Date	Area/location(s)		Type of Waste	Activity Description	Samples collected for lab analysis (for soil)? (Y or N)	Amount/Volume Transferred	Remaining Capacity of Drum (in %)
Example: 048	*4/22/2002*	*NRA*	*RP-07-S*	*drill cuttings*	*Spr 2000 GW*	*N*	*1/2 drum*	*50%*

Notes:

LA = Lake Area
IA = Insecticide Area
HA = Herbicide Area
NRA = Non-RP Area

DAILY WATER DISPOSAL LOG
RI/FS
RP - Portland Site

Date	Area/Location(s)		Type of Waste	Activity Description	Volume Generated/Transferred* (Give Units of Measure)
Example: 4/22/2002	*LA*	*RP-04-16*	*Purge Water*	*Fall 2001 GW*	*15 gallons*

Notes:

LA = Lake Area
IA = Insecticide Area
HA = Herbicide Area
NRA = Non-RP Area

ATTACHMENT C
TABLES

Attachment A
Table 1 - List of Analyses

Dry Weather Monitoring Water Sample Analysis	
Constituent Group[1]	**Method[2]**
Total/Dissolved Metals	EPA 200.7 or EPA 200.8
PCDDs/PCDFs	EPA 1613B
Total/Dissolved Mercury	EPA 1631E
Polychlorinated Biphenyls (PCBs)	EPA 1668
Hexavalent Chromium	EPA 7195 or EPA 7196A
Volatile Organic Compounds (VOCs)	EPA 8260C
Semivolatile Organic Compounds (SVOCs)	EPA 8270D
Polycyclic Aromatic Hydrocarbons (PAHs)	EPA 8270 SIM
Organochlorine Pesticides	EPA 1699
Chlorinated Herbicides	EPA 8151A
Petroleum Hydrocarbon Identification	NWTPH-HCID
Diesel Quantitation	NWTPH-Dx
Gasoline Quantitation	NWTPH-Gx

Notes:

NWTPH-Dx method run without silica gel.

[1]Refer to Table 2 of the QAPP (AMEC 2009b) for a list of analytes within each constituent group.

[2]Methods from Table 1 of the QAPP (AMEC 2009b)

EPA Method 8260C - VOCs			
Constituent	MDL	MRL	Units
Acetone	10.0	20.0	µg/L
Acrolein	5.00	10.0	µg/L
Acrylonitrile	1.00	2.00	µg/L
Benzene	0.125	0.250	µg/L
Bromobenzene	0.250	0.500	µg/L
Bromochloromethane	0.500	1.00	µg/L
Bromodichloromethane	0.500	1.00	µg/L
Bromoform	0.500	1.00	µg/L
Bromomethane	5.00	5.00	µg/L
2-Butanone (MEK)	5.00	10.0	µg/L
n-Butylbenzene	0.500	1.00	µg/L
sec-Butylbenzene	0.500	1.00	µg/L
tert-Butylbenzene	0.500	1.00	µg/L
Carbon disulfide	5.00	10.0	µg/L
Carbon tetrachloride	0.250	0.500	µg/L
Chlorobenzene	0.250	0.500	µg/L
Chloroethane	5.00	5.00	µg/L
2-Chloroethyl vinyl ether	5.00	10.0	µg/L
Chloroform	0.500	1.00	µg/L
Chloromethane	2.50	5.00	µg/L
2-Chlorotoluene	0.500	1.00	µg/L
4-Chlorotoluene	0.500	1.00	µg/L
Dibromochloromethane	0.500	1.00	µg/L
1,2-Dibromo-3-chloropropane	2.50	5.00	µg/L
1,2-Dibromoethane (EDB)	0.250	0.500	µg/L
Dibromomethane	0.500	1.00	µg/L
1,2-Dichlorobenzene	0.250	0.500	µg/L
1,3-Dichlorobenzene	0.250	0.500	µg/L
1,4-Dichlorobenzene	0.250	0.500	µg/L
Dichlorodifluoromethane	0.500	1.00	µg/L
1,1-Dichloroethane	0.250	0.500	µg/L
1,2-Dichloroethane (EDC)	0.250	0.500	µg/L
1,1-Dichloroethene	0.250	0.500	µg/L
cis-1,2-Dichloroethene	0.250	0.500	µg/L
trans-1,2-Dichloroethene	0.250	0.500	µg/L
1,2-Dichloropropane	0.250	0.500	µg/L
1,3-Dichloropropane	0.500	1.00	µg/L
2,2-Dichloropropane	0.500	1.00	µg/L
1,1-Dichloropropene	0.500	1.00	µg/L
cis-1,3-Dichloropropene	0.500	1.00	µg/L
trans-1,3-Dichloropropene	0.500	1.00	µg/L
Ethylbenzene	0.250	0.500	µg/L
Hexachlorobutadiene	2.50	5.00	µg/L
n-Hexane	0.500	1.00	µg/L
2-Hexanone	5.00	10.0	µg/L

Iodomethane	5.00	10.0	µg/L
Isopropylbenzene	0.500	1.00	µg/L
4-Isopropyltoluene	0.500	1.00	µg/L
Methylene chloride	2.50	5.00	µg/L
4-Methyl-2-pentanone (MiBK)	5.00	10.0	µg/L
Methyl tert-butyl ether (MTBE)	0.500	1.00	µg/L
Naphthalene	1.00	2.00	µg/L
n-Propylbenzene	0.250	0.500	µg/L
Styrene	0.500	1.00	µg/L
1,1,1,2-Tetrachloroethane	0.250	0.500	µg/L
1,1,2,2-Tetrachloroethane	0.250	0.500	µg/L
Tetrachloroethene (PCE)	0.250	0.500	µg/L
Tetrahydrofuran	5.00	10.0	µg/L
1,2,3-Trichlorobenzene	1.00	2.00	µg/L
1,2,4-Trichlorobenzene	1.00	2.00	µg/L
1,1,1-Trichloroethane	0.250	0.500	µg/L
1,1,2-Trichloroethane	0.250	0.500	µg/L
Trichloroethene (TCE)	0.250	0.500	µg/L
Trichlorofluoromethane	1.00	2.00	µg/L
1,2,3-Trichloropropane	0.500	1.00	µg/L
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	1.00	2.00	µg/L
1,2,4-Trimethylbenzene	0.500	1.00	µg/L
1,3,5-Trimethylbenzene	0.500	1.00	µg/L
Toluene	0.500	1.00	µg/L
Vinyl acetate	5.00	10.0	µg/L
Vinyl chloride	0.250	0.500	µg/L
m,p-Xylene	0.500	1.00	µg/L
o-Xylene	0.250	0.500	µg/L
EPA Method 8270D - SVOCs and 8270 SIM (PAHs)			
Constituent	MDL	MRL	Units
Acenaphthene	0.0100	0.0200	µg/L
Acenaphthylene	0.0100	0.0200	µg/L
Anthracene	0.0100	0.0200	µg/L
Benz(a)anthracene	0.0100	0.0200	µg/L
Benzo(a)pyrene	0.0150	0.0300	µg/L
Benzo(b)fluoranthene	0.0100	0.0200	µg/L
Benzo(k)fluoranthene	0.0100	0.0200	µg/L
Benzo(b+k)fluoranthene(s)	0.0200	0.0400	µg/L
Benzo(g,h,i)perylene	0.0100	0.0200	µg/L
Chrysene	0.0100	0.0200	µg/L
Dibenz(a,h)anthracene	0.0100	0.0200	µg/L
Fluoranthene	0.0100	0.0200	µg/L
Fluorene	0.0100	0.0200	µg/L
Indeno(1,2,3-cd)pyrene	0.0100	0.0200	µg/L
1-Methylnaphthalene	0.0200	0.0400	µg/L
2-Methylnaphthalene	0.0200	0.0400	µg/L
Naphthalene	0.0200	0.0400	µg/L

Phenanthrene	0.0100	0.0200	µg/L
Pyrene	0.0100	0.0200	µg/L
Carbazole	0.0150	0.0300	µg/L
Dibenzofuran	0.0100	0.0200	µg/L
4-Chloro-3-methylphenol	0.100	0.200	µg/L
2-Chlorophenol	0.0500	0.100	µg/L
2,4-Dichlorophenol	0.0500	0.100	µg/L
2,4-Dimethylphenol	0.0500	0.100	µg/L
2,4-Dinitrophenol	0.250	0.500	µg/L
4,6-Dinitro-2-methylphenol	0.250	0.500	µg/L
2-Methylphenol	0.0250	0.0500	µg/L
3+4-Methylphenol(s)	0.0250	0.0500	µg/L
2-Nitrophenol	0.100	0.200	µg/L
4-Nitrophenol	0.100	0.200	µg/L
Pentachlorophenol (PCP)	0.200	0.400	µg/L
Phenol	0.200	0.400	µg/L
2,3,4,6-Tetrachlorophenol	0.0500	0.100	µg/L
2,4,5-Trichlorophenol	0.0500	0.100	µg/L
2,4,6-Trichlorophenol	0.0500	0.100	µg/L
Bis(2-ethylhexyl)phthalate	1.10	2.20	µg/L
Butyl benzyl phthalate	1.50	3.00	µg/L
Diethylphthalate	1.50	3.00	µg/L
Dimethylphthalate	1.50	3.00	µg/L
Di-n-butylphthalate	1.50	3.00	µg/L
Di-n-octyl phthalate	1.50	3.00	µg/L
N-Nitrosodimethylamine	0.0250	0.0500	µg/L
N-Nitroso-di-n-propylamine	0.0250	0.0500	µg/L
N-Nitrosodiphenylamine	0.0250	0.0500	µg/L
Bis(2-Chloroethoxy) methane	0.0250	0.0500	µg/L
Bis(2-Chloroethyl) ether	0.0250	0.0500	µg/L
Bis(2-Chloroisopropyl) ether	0.0250	0.0500	µg/L
Hexachlorobenzene	0.0100	0.0200	µg/L
Hexachlorobutadiene	0.0250	0.0500	µg/L
Hexachlorocyclopentadiene	0.0500	0.100	µg/L
Hexachloroethane	0.0250	0.0500	µg/L
2-Chloronaphthalene	0.0100	0.0200	µg/L
1,2-Dichlorobenzene	0.0250	0.0500	µg/L
1,3-Dichlorobenzene	0.0250	0.0500	µg/L
1,4-Dichlorobenzene	0.0250	0.0500	µg/L
1,2,4-Trichlorobenzene	0.0250	0.0500	µg/L
4-Bromophenyl phenyl ether	0.0250	0.0500	µg/L
4-Chlorophenyl phenyl ether	0.0250	0.0500	µg/L
Aniline	0.0500	0.100	µg/L
4-Chloroaniline	0.0250	0.0500	µg/L
2-Nitroaniline	0.200	0.400	µg/L
3-Nitroaniline	0.200	0.400	µg/L
4-Nitroaniline	0.200	0.400	µg/L

Nitrobenzene	0.100	0.200	µg/L
2,4-Dinitrotoluene	0.100	0.200	µg/L
2,6-Dinitrotoluene	0.100	0.200	µg/L
Benzoic acid	1.25	2.50	µg/L
Benzyl alcohol	0.100	0.200	µg/L
Isophorone	0.0250	0.0500	µg/L
Azobenzene (1,2-DPH)	0.0250	0.0500	µg/L
Benzidine	0.100	0.200	µg/L
Bis(2-Ethylhexyl) adipate	0.0500	0.100	µg/L
3,3'-Dichlorobenzidine	0.100	0.200	µg/L
1,2-Dinitrobenzene	0.250	0.500	µg/L
1,3-Dinitrobenzene	0.250	0.500	µg/L
1,4-Dinitrobenzene	0.250	0.500	µg/L
Pyridine	0.100	0.200	µg/L
2,3,5,6-Tetrachlorophenol	0.0500	0.100	µg/L
EPA Method 200.7 or EPA Method 200.8			
Constituent	MDL	MRL	Units
Arsenic	0.500	2.00	µg/L
Barium	0.500	1.00	µg/L
Cadmium	0.500	1.00	µg/L
Calcium	50.0	100.0	µg/L
Chromium	0.500	2.00	µg/L
Copper	1.00	2.00	µg/L
Iron	25.0	50.0	µg/L
Lead	0.500	1.00	µg/L
Magnesium	250.0	500.0	µg/L
Manganese	0.500	1.00	µg/L
Nickel	0.500	2.00	µg/L
Selenium	1.00	2.00	µg/L
Silver	0.500	1.00	µg/L
Zinc	2.00	4.00	µg/L
EPA Method 1631E			
Constituent	MDL	MRL	Units
Mercury	0.0002	0.0005	µg/L
EPA Method 7195 or EPA Method 7196A			
Constituent	MDL	MRL	Units
Hexavalent Chromium	5	10	µg/L
EPA Method 1699			
Constituent	MDL	MRL	Units
Hexachlorobenzene	3.7	40	pg/L
alpha-BHC	1.8	40	pg/L
Lindane (gamma-BHC)	2.7	40	pg/L
beta-BHC	3.6	40	pg/L
delta-BHC	2.1	40	pg/L
Heptachlor	0.8	200	pg/L
Aldrin	0.9	40	pg/L
Oxychlordane	2.8	40	pg/L

cis-Heptachlor Expoxide	2	40	pg/L
trans-Heptachlor Epoxide	8.5	80	pg/L
trans-Chlordane (gamma)	2.7	40	pg/L
trans-Nonachlor	2.3	40	pg/L
cis-Chlordane (alpha)	2.2	40	pg/L
Endosulfan I	8.5	400	pg/L
2,4'-DDE	1.1	80	pg/L
4,4'-DDE	1.4	80	pg/L
Dieldrin	2.1	40	pg/L
Endrin	2.2	80	pg/L
cis-Nonachlor	2.3	40	pg/L
Endosulfan II	17	400	pg/L
2,4'-DDD	2.7	40	pg/L
2,4'-DDT	4.4	80	pg/L
4,4'-DDD	3.2	40	pg/L
4,4'-DDT	4.5	80	pg/L
Endosulfan Sulfate	5.6	400	pg/L
4,4'-Methoxychlor	2.8	400	pg/L
Mirex	0.9	40	pg/L
Endrin Aldehyde	3.5	400	pg/L
Endrin Ketone	3.4	400	pg/L
EPA Method 1668A			
Constituent	MDL	MRL	Units
PCB 1	82	200	pg/L
PCB 2	4	10	pg/L
PCB 3	88	200	pg/L
PCB 4	172	500	pg/L
PCB 10	22	50	pg/L
PCB 9	20	50	pg/L
PCB 7	15	50	pg/L
PCB 6	13	50	pg/L
PCB 5	11	50	pg/L
PCB 8	121	500	pg/L
PCB 14	31	100	pg/L
PCB 11	105	200	pg/L
PCB 13	28	100	pg/L
PCB 12	28	100	pg/L
PCB 15	183	500	pg/L
PCB 19	42	100	pg/L
PCB 30	175	500	pg/L
PCB 18	175	500	pg/L
PCB 17	86	200	pg/L
PCB 27	59	200	pg/L
PCB 24	53	200	pg/L
PCB 16	35	100	pg/L
PCB 32	84	200	pg/L
PCB 34	74	200	pg/L

PCB 23	50	200	pg/L
PCB 29	83	200	pg/L
PCB 26	83	200	pg/L
PCB 25	55	200	pg/L
PCB 31	152	500	pg/L
PCB 28	192	500	pg/L
PCB 20	192	500	pg/L
PCB 21	51	200	pg/L
PCB 33	51	200	pg/L
PCB 22	90	200	pg/L
PCB 36	79	200	pg/L
PCB 39	85	200	pg/L
PCB 38	83	200	pg/L
PCB 35	77	200	pg/L
PCB 37	132	200	pg/L
PCB 54	118	200	pg/L
PCB 50	58	200	pg/L
PCB 53	58	200	pg/L
PCB 45	51	200	pg/L
PCB 51	51	200	pg/L
PCB 46	101	200	pg/L
PCB 52	191	500	pg/L
PCB 73	160	500	pg/L
PCB 43	94	200	pg/L
PCB 69	115	500	pg/L
PCB 49	115	500	pg/L
PCB 48	76	200	pg/L
PCB 65	195	500	pg/L
PCB 47	195	500	pg/L
PCB 44	195	500	pg/L
PCB 62	57	200	pg/L
PCB 75	57	200	pg/L
PCB 59	57	200	pg/L
PCB 42	61	200	pg/L
PCB 41	119	500	pg/L
PCB 71	119	500	pg/L
PCB 40	119	500	pg/L
PCB 64	70	200	pg/L
PCB 72	158	500	pg/L
PCB 68	149	500	pg/L
PCB 57	125	500	pg/L
PCB 58	127	500	pg/L
PCB 67	147	500	pg/L
PCB 63	138	500	pg/L
PCB 61	171	500	pg/L
PCB 70	171	500	pg/L
PCB 76	171	500	pg/L

PCB 74	171	500	pg/L
PCB 66	162	500	pg/L
PCB 55	120	500	pg/L
PCB 56	98	200	pg/L
PCB 60	131	500	pg/L
PCB 80	175	500	pg/L
PCB 79	173	500	pg/L
PCB 78	171	500	pg/L
PCB 81	177	500	pg/L
PCB 77	169	500	pg/L
PCB 104	228	500	pg/L
PCB 96	210	500	pg/L
PCB 103	225	500	pg/L
PCB 94	121	500	pg/L
PCB 95	221	500	pg/L
PCB 100	221	500	pg/L
PCB 93	221	500	pg/L
PCB 102	221	500	pg/L
PCB 98	221	500	pg/L
PCB 88	118	500	pg/L
PCB 91	118	500	pg/L
PCB 84	124	500	pg/L
PCB 89	195	500	pg/L
PCB 121	209	500	pg/L
PCB 92	115	500	pg/L
PCB 113	241	1000	pg/L
PCB 90	241	1000	pg/L
PCB 101	241	1000	pg/L
PCB 83	217	500	pg/L
PCB 99	217	500	pg/L
PCB 112	245	1000	pg/L
PCB 119	149	500	pg/L
PCB 108	149	500	pg/L
PCB 86	149	500	pg/L
PCB 97	149	500	pg/L
PCB 125	149	500	pg/L
PCB 87	149	500	pg/L
PCB 117	104	200	pg/L
PCB 116	104	200	pg/L
PCB 85	104	200	pg/L
PCB 110	243	1000	pg/L
PCB 115	243	1000	pg/L
PCB 82	133	500	pg/L
PCB 111	243	1000	pg/L
PCB 120	147	500	pg/L
PCB 107	200	1000	pg/L
PCB 124	200	1000	pg/L

PCB 109	103	500	pg/L
PCB 123	150	500	pg/L
PCB 106	143	500	pg/L
PCB 118	193	500	pg/L
PCB 122	117	500	pg/L
PCB 114	120	500	pg/L
PCB 105	109	200	pg/L
PCB 127	278	1000	pg/L
PCB 126	136	500	pg/L
PCB 155	339	1000	pg/L
PCB 152	238	1000	pg/L
PCB 150	328	1000	pg/L
PCB 136	91	200	pg/L
PCB 145	317	1000	pg/L
PCB 148	324	1000	pg/L
PCB 151	112	500	pg/L
PCB 135	112	500	pg/L
PCB 154	112	500	pg/L
PCB 144	167	500	pg/L
PCB 147	179	500	pg/L
PCB 149	179	500	pg/L
PCB 134	134	500	pg/L
PCB 143	134	500	pg/L
PCB 139	196	500	pg/L
PCB 140	196	500	pg/L
PCB 131	121	500	pg/L
PCB 142	311	500	pg/L
PCB 132	125	500	pg/L
PCB 133	169	500	pg/L
PCB 165	361	1000	pg/L
PCB 146	182	500	pg/L
PCB 161	352	1000	pg/L
PCB 153	130	500	pg/L
PCB 168	130	500	pg/L
PCB 141	93	200	pg/L
PCB 130	136	500	pg/L
PCB 137	300	1000	pg/L
PCB 164	136	500	pg/L
PCB 138	211	500	pg/L
PCB 163	211	500	pg/L
PCB 129	211	500	pg/L
PCB 160	211	500	pg/L
PCB 158	96	200	pg/L
PCB 166	124	500	pg/L
PCB 128	124	500	pg/L
PCB 159	348	1000	pg/L
PCB 162	355	1000	pg/L

PCB 167	115	500	pg/L
PCB 156	132	500	pg/L
PCB 157	132	500	pg/L
PCB 169	161	500	pg/L
PCB 188	235	500	pg/L
PCB 179	229	500	pg/L
PCB 184	403	1000	pg/L
PCB 176	385	1000	pg/L
PCB 186	407	1000	pg/L
PCB 178	221	500	pg/L
PCB 175	383	1000	pg/L
PCB 187	191	500	pg/L
PCB 182	398	1000	pg/L
PCB 183	401	1000	pg/L
PCB 185	401	1000	pg/L
PCB 174	186	500	pg/L
PCB 177	141	500	pg/L
PCB 181	396	1000	pg/L
PCB 171	374	1000	pg/L
PCB 173	374	1000	pg/L
PCB 172	377	1000	pg/L
PCB 192	420	1000	pg/L
PCB 193	136	500	pg/L
PCB 180	136	500	pg/L
PCB 191	418	1000	pg/L
PCB 170	162	500	pg/L
PCB 190	234	500	pg/L
PCB 189	177	500	pg/L
PCB 202	442	1000	pg/L
PCB 201	440	1000	pg/L
PCB 204	447	1000	pg/L
PCB 197	245	1000	pg/L
PCB 200	245	1000	pg/L
PCB 198	203	500	pg/L
PCB 199	203	500	pg/L
PCB 196	429	1000	pg/L
PCB 203	444	1000	pg/L
PCB 195	427	1000	pg/L
PCB 194	170	500	pg/L
PCB 208	449	1000	pg/L
PCB 208	455	1000	pg/L
PCB 207	453	1000	pg/L
PCB 206	451	1000	pg/L
PCB 209	153	500	pg/L
EPA Method 1613B			
Constituent	MDL	MRL	Units
2,3,7,8-TCDD	1.83	5	pg/L

1,2,3,7,8-PeCDD	7.33	25	pg/L
1,2,3,4,7,8-HxCDD	5.40	25	pg/L
1,2,3,6,7,8-HxCDD	4.43	25	pg/L
1,2,3,7,8,9-HxCDD	4.16	25	pg/L
1,2,3,4,6,7,8-HpCDD	5.49	25	pg/L
OCDD	6.21	50	pg/L
2,3,7,8-TCDF	1.50	5	pg/L
1,2,3,7,8-PeCDF	3.41	25	pg/L
2,3,4,7,8-PeCDF	6.24	25	pg/L
1,2,3,4,7,8-HxCDF	4.02	25	pg/L
1,2,3,6,7,8-HxCDF	3.36	25	pg/L
2,3,4,6,7,8-HxCDF	5.26	25	pg/L
1,2,3,7,8,9-HxCDF	6.86	25	pg/L
1,2,3,4,6,7,8-HpCDF	5.93	25	pg/L
1,2,3,4,7,8,9-HpCDF	6.96	25	pg/L
OCDF	9.96	50	pg/L
EPA Method 8151A			
Constituent	MDL	MRL	Units
2,4-D	0.04	0.08	µg/L
2,4-DB	0.04	0.08	µg/L
2,4,5-T	0.04	0.08	µg/L
2,4,5-TP	0.04	0.08	µg/L
Acifluorfen	0.04	0.08	µg/L
Bentazon	0.04	0.08	µg/L
Clopyralid	0.04	0.08	µg/L
Dicamba	0.04	0.08	µg/L
Dichlorprop	0.04	0.08	µg/L
Dinoseb	0.04	0.08	µg/L
MCPA	0.04	0.08	µg/L
MCPP	0.04	0.08	µg/L
Pentachlorophenol	0.04	0.08	µg/L
Picloram	0.04	0.08	µg/L
Quinclorac	0.04	0.08	µg/L
Triclopyr	0.04	0.08	µg/L
Method NWTPH-HCIDD/Gx/DX			
Constituent	MDL	MRL	Units
NWTPH-HCID	0.25	0.5	mg/L
NWTPH-Gx	0.15	0.25	mg/L
NWTPH-Dx	0.3	0.6	mg/L

TABLE J-1 REVISED (4/29/14)
Screening Level Values for Constituents Detected in Groundwater and Surface Water Samples
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Constituent of Interest [1]	CAS Number	Surrogate	SCE Screening Value [2]	Source
Metals (mg/L)				
Aluminum	7429-90-5		0.05	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Antimony	7440-36-0		0 006	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Arsenic	7440-38-2		1.4E-05	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Barium	7440-39-3		0 004	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Beryllium	7440-41-7		1.17E-05	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Boron	7440-42-8		1 6E-03	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Cadmium	7440-43-9		9 0E-05	Portland Harbor BERA TRVs, April 11, 2008.
Calcium	7440-70-2		116	DEQ Guidance for Level II Ecological Risk Assessment SLVs, 2001.
Chromium	7440-47-3		0 074	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Cobalt	7440-48-4		0 011	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Copper	7440-50-8		2.7E-03	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Cyanide	57-12-5		5 2E-03	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Hexavalent Chromium	18540-29-9		4 3E-05	DEQ Guidance for Level II Ecological Risk Assessment SLVs, 2001.
Iron	7439-89-6		1	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Lead	7439-92-1		5.4E-04	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Magnesium	7439-95-4		82	DEQ Guidance for Level II Ecological Risk Assessment SLVs, 2001.
Manganese	7439-96-5		0.01	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Mercury	7439-97-6		1 2E-05	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Molybdenum	7439-98-7		0.18	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Nickel	7440-02-0		0 016	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Potassium	7440-09-7		53	DEQ Guidance for Level II Ecological Risk Assessment SLVs, 2001.
Selenium	7782-49-2		0 005	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Silver	7440-22-4		1 2E-04	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Sodium	7440-23-5		680	DEQ Guidance for Level II Ecological Risk Assessment SLVs, 2001.
Sulfate			--	--
Thallium	7440-28-0		4.7E-05	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Tin	7440-31-5		0 073	DEQ Guidance for Level II Ecological Risk Assessment SLVs, 2001.
Uranium	7440-61-1		2 6E-03	DEQ Guidance for Level II Ecological Risk Assessment SLVs, 2001.
Vanadium	7440-62-2		2 6E-03	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Zinc	7440-66-6		0 033	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
PCDD/PCDFs (mg/L)				
1,2,3,4,6,7,8,9-OCDD	3268-87-9	2 3 7 8-TCDD TEF[3,4]	1.7E-09	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
1,2,3,4,6,7,8,9-OCDF	39001-02-0	2 3 7 8-TCDD TEF[3,4]	1.7E-09	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
1,2,3,4,6,7,8-HpCDD	35822-46-9	2,3,7,8-TCDD TEF[3]	5.1E-11	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
1,2,3,4,6,7,8-HpCDF	67562-39-4	2,3,7,8-TCDD TEF[3]	5.1E-11	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
1,2,3,4,7,8,9-HpCDF	55673-89-7	2,3,7,8-TCDD TEF[3]	5.1E-11	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
1,2,3,4,7,8-HxCDD	39227-28-6	2 3 7 8-TCDD TEF[3]	5.1E-12	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
1,2,3,4,7,8-HxCDF	70648-26-9	2 3 7 8-TCDD TEF[3]	5.1E-12	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
1,2,3,6,7,8-HxCDD	57653-85-7	2 3 7 8-TCDD TEF[3]	5.1E-12	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
1,2,3,6,7,8-HxCDF	57117-44-9	2 3 7 8-TCDD TEF[3]	5.1E-12	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
1,2,3,7,8,9-HxCDD	19408-74-3	2 3 7 8-TCDD TEF[3]	5.1E-12	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
1,2,3,7,8,9-HxCDF	72918-21-9	2 3 7 8-TCDD TEF[3]	5.1E-12	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
1,2,3,7,8-PeCDD	40321-76-4	2 3 7 8-TCDD TEF[3]	5.1E-13	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
1,2,3,7,8-PeCDF	57117-41-6	2 3 7 8-TCDD TEF[3,4]	1.7E-12	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
2,3,4,6,7,8-HxCDF	60851-34-5	2 3 7 8-TCDD TEF[3]	3 0E-12	2,3,7,8-TCDD/TEF; EPA AWQC, 1993
2,3,4,7,8-PeCDF	57117-31-4	2 3 7 8-TCDD TEF[3,4]	1.7E-12	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
2,3,7,8-TCDD	1746-01-6		5.1E-13	Portland Harbor BERA TRVs, April 11, 2008.
2,3,7,8-TCDF	51207-31-9	2 3 7 8-TCDD TEF[3,4]	5.1E-12	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Herbicides (mg/L)				
2,4,5-T	93-76-5		0 004	Canadian Water Quality Guidance Surface Water Quality Screening Level Benchmark[8]
2 4 5-TP (Silvex)	93-72-1		0 005	Portland Harbor BERA TRVs, April 11, 2008.
2,4-D	94-75-7		0 004	Canadian Water Quality Guidance Surface Water Quality Screening Level Benchmark[8]
2,4-DB	94-82-6		0 004	Canadian Water Quality Guidance Surface Water Quality Screening Level Benchmark[8]
Bromoxynil	1689-84-5		0 005	Canadian Water Quality Guidance Surface Water Quality Screening Level Benchmark[8]
Dalapon	75-99-0		0.2	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Dicamba	1918-00-9		0.01	Canadian Water Quality Guidance Surface Water Quality Screening Level Benchmark[8]
Dichlorprop	120-36-5		0 004	Canadian Water Quality Guidance Surface Water Quality Screening Level Benchmark[8]
Dinoseb	88-85-7		5 0E-05	Canadian Water Quality Guidance Surface Water Quality Screening Level Benchmark[8]
MCPA	94-74-6		2 6E-03	Canadian Water Quality Guidance Surface Water Quality Screening Level Benchmark[8]
MCPP	93-65-2	MCPA[4]	2 6E-03	Canadian Water Quality Guidance Surface Water Quality Screening Level Benchmark[8]
Insecticides (mg/L)				
2,4'-DDD	53-19-0	4,4'-DDT	3.10E-08	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
2,4'-DDE	3424-82-6	4,4'-DDT	2.20E-08	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
2,4'-DDT	789-02-6	4,4'-DDT	2.20E-08	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
4,4'-DDD	72-54-8	4 4'-DDT[4]	3.10E-08	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
4,4'-DDE	72-55-9	4 4'-DDT[4]	2.20E-08	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
4,4'-DDT	50-29-3		2.20E-08	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Total DDx		4,4'-DDT	1 0E-06	EPA NRWQC SLV, 2004
Aldrin	309-00-2		5 0E-09	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
alpha-BHC	319-84-6		4.90E-07	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
alpha-Chlordane	5103-71-9	Chlordane	8.10E-08	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
beta-BHC	319-85-7		1.70E-06	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Chlordane	57-74-9		8.10E-08	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
cis-Nonachlor	5103-73-1	Chlordane	8.10E-08	Portland Harbor JSCS Document, Table 3-1 updated July 2007.

TABLE J-1 REVISED (4/29/14)
Screening Level Values for Constituents Detected in Groundwater and Surface Water Samples
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Constituent of Interest [1]	CAS Number	Surrogate	SCE Screening Value [2]	Source
Diazinon	333-41-5		0 026	EPA RSLs, May 2010.
delta-BHC	319-86-8	beta-BHC	3.70E-05	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Dieldrin	60-57-1		5.40E-09	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Endosulfan I	959-98-8		5.10E-05	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Endosulfan II	33213-65-9	Endosulfan I	5.10E-05	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Endosulfan Sulfate	1031-07-8	Endosulfan I [4]	5.10E-05	Oak Ridge National Laboratory Tier II SCV
Endrin	72-20-8		2.30E-06	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Endrin Aldehyde	7421-93-4	Endrin[4]	2.30E-06	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Endrin Ketone	53494-70-5	Endrin	2.30E-06	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
gamma-BHC (Lindane)	58-89-9		8 0E-05	DEQ AWQC SLV, 2004.
gamma-Chlordane	5103-74-2	Chlordane	8.10E-08	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Heptachlor	76-44-8		7.90E-09	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Heptachlor Epoxide	1024-57-3		3.90E-09	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Hexachlorobenzene	118-74-1		2.90E-08	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Malathion	121-75-5		0.73	EPA RSLs, May 2010.
Methoxychlor	72-43-5		1.90E-05	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Mirex	2385-85-5		1 0E-06	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Oxychlordane	27304-13-8	Chlordane	8.10E-08	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Total Chlordane		Chlordane	8.10E-08	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Total Endosulfans [6]			5.10E-05	Oak Ridge National Laboratory Tier II SCV
Total Hexachlorocyclohexanes			2.20E-03	Oak Ridge National Laboratory Tier II SCV
Toxaphene	8001-35-2		2.80E-08	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
trans-Nonachlor	39765-80-5	Chlordane	8.10E-08	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
PCBs (mg/L)				
PCB 77	32598-13-3	2 3 7 8-TCDD TEF[3,4]	5.20E-10	2,3,7,8-TCDD/TEF; EPA AWQC, 1993
PCB 105	32598-14-4	2 3 7 8-TCDD TEF[3,4]	1.70E-08	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
PCB 114	74472-37-0	2 3 7 8-TCDD TEF[3,4]	1.70E-08	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
PCB 118	31508-00-6	2 3 7 8-TCDD TEF[3,4]	1.70E-08	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
PCB 156 & 157	38380-08-4	2 3 7 8-TCDD TEF[3,4]	1.70E-08	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
PCB 167	52663-72-6	2 3 7 8-TCDD TEF[3,4]	1.70E-08	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
PCB 189	39635-31-9	2 3 7 8-TCDD TEF[3,4]	1.70E-08	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Total PCBs [7]	1336-36-3		6.40E-09	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
SVOCs (mg/L)				
1-Methylnaphthalene	90-12-0		2 0E-04	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
2,3,4,6-Tetrachlorophenol	58-90-2		0 001	Canadian Water Quality Guidance Surface Water Quality Screening Level Benchmark[8]
2 3 5-Trimethylnaphthalene	2245-38-7	Naphthalene	1.40E-04	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
2,4,5-Trichlorophenol	95-95-4	2,4,6-Trichlorophenol [4]	3.20E-03	Oak Ridge National Laboratory Tier II SCV Toxicological Benchmarks for Screening in Potential Contaminants of Concern for Effects on Aquatic Biota, 1996 Revision
2,4,6-Trichlorophenol	88-06-2		2.40E-04	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
2,4-Dibromophenol	615-58-7	2,4-Dichlorophenol	0 029	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
2,4-Dichlorophenol	120-83-2		0 029	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
2,4-Dimethylphenol	105-67-9		0 042	DEQ Guidance for Level II Ecological Risk Assessment SLVs, 2001.
2,4-Dinitrophenol	51-28-5		0 073	EPA Region 4 Water Screening Level Value[8]
2,6-Dichloro-4-methylphenol	2432-12-4	4-Chloro-3-Methylphenol	3.20E-04	Portland Harbor BERA TRVs, April 11, 2008
2,6-Dichlorobenzothiazole	3622-23-9		--	--
2,6-Dichlorophenol	87-65-0	2,4-Dichlorophenol	0 029	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
2 6-Dimethylnaphthalene	581-42-0	Naphthalene	1.40E-04	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
2-Chlorophenol	95-57-8		0 015	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
2-Methyl-4,6-Dinitrophenol	534-52-1		2.90E-03	EPA RSLs, May 2010.
2-Methylnaphthalene	91-57-6		2 0E-04	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
2-Methylphenol	95-48-7		0 013	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
2-Nitrophenol	88-75-5		0.15	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
3 & 4-Methylphenol	1319-77-3	2-Methylphenol	0 013	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
3,3'-Dichlorobenzidine	91-94-1		2.80E-06	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
3/4-Cresol	65794-96-9		3 0E-04	EPA Region 4 Water Screening Level Value[8]
3-Chlorophenol	108-43-0	2-Chlorophenol	0 015	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
4,6-Dichloro-o-cresol	1570-65-6	2-Chlorophenol/ 4-Chloro-3-Methylphenol [5]	3.20E-04	Portland Harbor BERA TRVs, April 11, 2008
4-Chloro-3-Methylphenol	59-50-7		3.20E-04	Portland Harbor BERA TRVs, April 11, 2008
4-Chloro-o-cresol	1570-64-5	2-Chlorophenol/ 4-Chloro-3-Methylphenol [5]	3.20E-04	Portland Harbor BERA TRVs, April 11, 2008
4-Chlorophenol	106-48-9	2-Chlorophenol	0 015	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
4-Methylphenol (p-Cresol)	106-44-5	2-Methylphenol[4]	0 013	DEQ Guidance for Level II Ecological Risk Assessment SLVs, 2001.
4-Nitrophenol	100-02-7		0.15	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Acenaphthene	83-32-9		2 0E-04	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Acenaphthylene	208-96-8		2 0E-04	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Anthracene	120-12-7		2 0E-04	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Benzo(a)anthracene	56-55-3		1.80E-06	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Benzo(a)pyrene	50-32-8		1.80E-06	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Benzo(b)fluoranthene	205-99-2		1.80E-06	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Benzo(g h i)Perylene	191-24-2		2 0E-04	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Benzo(k)Fluoranthene	207-08-9		1.80E-06	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Benzofluoranthenes	56832-73-6	Benzo(k)Fluoranthene	1.80E-06	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Benzoic Acid	65-85-0		0 042	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Benzyl Alcohol	100-51-6		8.60E-03	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
bis(2-Chloroethyl)ether	111-44-4		1.20E-05	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
bis(2-Chloroisopropyl)ether	108-60-1		3.20E-04	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
bis(2-Ethylhexyl)phthalate	117-81-7		2.20E-04	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Butylbenzylphthalate	85-68-7		0 003	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Carbazole	86-74-8		3.40E-03	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Chrysene	218-01-9		1.80E-06	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Dibenzo(a h)anthracene	53-70-3		1.80E-06	Portland Harbor JSCS Document, Table 3-1 updated July 2007.

TABLE J-1 REVISED (4/29/14)
Screening Level Values for Constituents Detected in Groundwater and Surface Water Samples
RI/SCE Report
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Constituent of Interest [1]	CAS Number	Surrogate	SCE Screening Value [2]	Source
Dibenzofuran	132-64-9		3.70E-03	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Diethylphthalate	84-66-2		0 003	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Dimethylphthalate	131-11-3		0 003	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Di-n-butylphthalate	84-74-2		0 003	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
di-n-Octyl Phthalate	117-84-0		0 003	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Fluoranthene	206-44-0		2 0E-04	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Fluorene	86-73-7		2 0E-04	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Indeno(1,2,3-cd)pyrene	193-39-5		1.80E-06	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Isophorone	78-59-1		0 071	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Naphthalene	91-20-3		1.40E-04	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
n-Nitrosodimethylamine	62-75-9		4.20E-07	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
n-Nitrosodiphenylamine	86-30-6		6 0E-04	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Pentachlorophenol	87-86-5		3 0E-04	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Phenanthrene	85-01-8		2 0E-04	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Phenol	108-95-2		0.11	DEQ Guidance for Level II Ecological Risk Assessment SLVs, 2001.
Pyrene	129-00-0		2 0E-04	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Tetrachlorophenols	25167-83-3	2,3,4,6-Tetrachlorophenol	0 001	EPA Regional Screening Levels, 2009.
Petroleum Hydrocarbons (mg/L)				
Diesel-Range Organics (DRO)	68334-30-5		--	--
Gasoline Range Hydrocarbons	86290-81-5		--	--
Residual-Range Organics (RRO)	WEY-130-500		--	--
VOCs (mg/L)				
1,1,1-Trichloroethane	71-55-6		0 011	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
1,1,2,2-Tetrachloroethane	79-34-5		6.70E-05	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
1,1,2-Trichloroethane	79-00-5		2.40E-04	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
1,1-Dichloroethane	75-34-3	1 1-Dichloroethene[4]	2.40E-03	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
1,1-Dichloroethene	75-35-4		0 007	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
1,1-Dichloropropene	563-58-6	cis-1,3-Dichloropropene	5.50E-05	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
1 2 3-Trichlorobenzene	87-61-6		0 029	EPA RSLs May 2010.
1 2 3-Trichloropropane	96-18-4		7.20E-07	EPA RSLs May 2010.
1,2,4-Trichlorobenzene	120-82-1		2.30E-03	EPA RSLs, May 2010.
1,2,4-Trimethylbenzene	95-63-6		7.30E-03	Portland Harbor BERA TRVs, April 11, 2008.
1,2-Dibromo-3-Chloropropane	96-12-8		3.20E-07	EPA RSLs, May 2010.
1,2-Dichlorobenzene	95-50-1		0 014	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
1,2-Dichloroethane	107-06-2		1.50E-04	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
1,2-Dichloroethene	540-59-0		0.33	EPA RSLs, May 2010.
1,2-Dichloropropane	78-87-5		3.90E-04	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
1,3,5-Trimethylbenzene	108-67-8		7.30E-03	Portland Harbor BERA TRVs, April 11, 2008.
1,3-Dichlorobenzene	541-73-1		0 014	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
1,3-Dichloropropane	142-28-9		0.73	EPA RSLs, May 2010.
1,4-Dichlorobenzene	106-46-7		4.30E-04	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
2 2-Dichloropropane	594-20-7		--	--
2-Butanone (MEK)	78-93-3		7.1	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
2-Chlorotoluene	95-49-8		0.73	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
2-Ethyl-1-hexanol	104-76-7		0.2	Ecotox Value for Bluegill (LC50/50).
2-Hexanone	591-78-6		0 047	EPA RSLs, May 2010.
4-Chlorotoluene	106-43-4		0.73	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
4-Isopropyltoluene	99-87-6	Isopropylbenzene	7.30E-03	Portland Harbor BERA TRVs, April 11, 2008.
4-Methyl-2-pentanone (MIBK)	108-10-1		0.17	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
5-Methyl-2-heptanol	54630-50-1		--	--
6-Methyl-1-heptanol	1653-40-3		--	--
Acetone	67-64-1		1.5	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Benzene	71-43-2		4.10E-04	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Bromobenzene	108-86-1		0 088	EPA RSLs May 2010.
Bromochloromethane	74-97-5	Bromodichloromethane	1.20E-04	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Bromodichloromethane	75-27-4		1.20E-04	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Bromoform	75-25-2		8.50E-03	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Bromomethane	74-83-9		8.70E-03	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Carbon Disulfide	75-15-0		9.20E-04	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Carbon Tetrachloride	56-23-5		1.60E-04	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Chlorobenzene	108-90-7		0.05	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Chloroethane	75-00-3		0 047	Portland Harbor BERA TRVs, April 11, 2008.
Chloroform	67-66-3		1.90E-04	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Chloromethane	74-87-3		0.19	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
cis-1,2-Dichloroethene	156-59-2		0.07	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
cis-1,3-Dichloropropene	10061-01-5		5.50E-05	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Dibromochloromethane	124-48-1		1.50E-04	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Dibromomethane	74-95-3		8.20E-03	EPA RSLs May 2010.
Dichlorodifluoromethane	75-71-8		0.39	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Diethyl ether	60-29-7		7.3	EPA RSLs, May 2010.
Ethylbenzene	100-41-4		1.50E-03	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Hexachlorobutadiene	87-68-3		8.60E-04	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Iodomethane	74-88-4	Bromomethane	8.70E-03	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Isobutyl Alcohol	78-83-1	Isopropanol [4]	7.50E-03	EPA Region 6 Surface Water Screening Benchmark
Isopropylbenzene	98-82-8		7.30E-03	Portland Harbor BERA TRVs, April 11, 2008.
m,p-Xylenes	1330-20-7		1.80E-03	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Methyl tert-Butyl Ether (MTBE)	1634-04-4		0 012	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Methylene Chloride	75-09-2		4.80E-03	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
n-Butylbenzene	104-51-8		0 036	Update to Guidance for Conducting Ecological Risk Assessments at Remediation Sites in Texas RG-263 (Revised), January 2006.
n-Propylbenzene	103-65-1		0 064	Update to Guidance for Conducting Ecological Risk Assessments at Remediation Sites in Texas RG-263 (Revised), January 2006.
o-Cymene	527-84-4		7.30E-03	Portland Harbor BERA TRVs, April 11, 2008.
o-Xylene	95-47-6		0 013	Portland Harbor JSCS Document, Table 3-1 updated July 2007.

TABLE J-1 REVISED (4/29/14)
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RI/SCE Report
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Constituent of Interest [1]	CAS Number	Surrogate	SCE Screening Value [2]	Source
sec-Butylbenzene	135-98-8		0 041	Update to Guidance for Conducting Ecological Risk Assessments at Remediation Sites in Texas RG-263 (Revised), January 2006.
Styrene	100-42-5		0.1	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
tert-Butylbenzene	98-06-6		0 048	Update to Guidance for Conducting Ecological Risk Assessments at Remediation Sites in Texas RG-263 (Revised), January 2006.
Tetrachloroethene	127-18-4		1.10E-04	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Toluene	108-88-3		9.80E-03	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Total Xylenes	1330-20-7		1.80E-03	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
trans-1,2-Dichloroethene	156-60-5		0.1	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
trans-1,3-Dichloropropene	10061-02-6		5.50E-05	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Trichloroethene	79-01-6		0 002	EPA RSLs, May 2010.
Trichlorofluoromethane	75-69-4		1.3	Portland Harbor JSCS Document, Table 3-1 updated July 2007.
Vinyl Chloride	75-01-4		1.60E-05	Portland Harbor JSCS Document, Table 3-1 updated July 2007.

Notes

[1] Constituents detected in groundwater and surface water datasets included in the SCE screening.

[2] SCE screening value is that stipulated at the May 4, 2010 DEQ/StarLink Meeting.

Otherwise it is the most conservative of the following sources:
"Other" values from multiple sources as stipulated in DEQ Comment Letter dated July 1, 2009.
Portland Harbor BERA TRVs, April 11, 2008.
Most conservative JSCS value. Note: EPA Tap Water PRGs listed on JSCS Table 3-1 were updated with the April 2009 RSLs prior to determination of the most conservative JSCS value.
DEQ Level II ERA SLV (most conservative surface water value).
EPA Region 3,6,9 Consolidated RSLs, Note: If no tap water value provided, but MCL provided, then MCL used.
Values from multiple sources as stipulated in DEQ Comment Letter dated February 5, 2010

[3] Value calculated by dividing 2,3,7,8-TCDD screening value by the 2005 WHO TEF value for humans and mammals (JSCS values) or the most conservative 1998 WHO TEF for birds, mammals, and fish (DEQ 7/1/09 value).

[4] Listed analyte is used as a surrogate only when analyte-specific SLVs are unavailable.

[5] 4-Chloro-3-methylphenol is used as a surrogate only for the Portland Harbor TRV, because no TRV is available for 2-chlorophenol.

[6] Value stipulated in February 5, 2010 DEQ Comment Letter corrected for decimal place discrepancy.

[7] Value applies to Total PCBs (as congeners) and Total PCBs (as Aroclors).

[8] The primary source is reported as referenced by DEQ in letters dated July 1, 2009 and February 5, 2010.

Acronyms and Abbreviations

-- = not available
mg/L = milligrams per liter
AWQC = Ambient Water Quality Criteria
BERA = baseline ecological risk assessment
CAS = Chemical Abstract Service
DEQ = Oregon Department of Environmental Quality
EPA = United States Environmental Protection Agency
ERA = ecological risk assessment
JSCS = Portland Harbor Joint Source Control Strategy
MCL = Maximum Contaminant Level
NRWQC = National Recommended Water Quality Criteria
PCB = polychlorinated biphenyl
PRG = preliminary remediation goal
RSL = regional screening level
SCE = Source Control Evaluation
SLV = screening level value
SVOC = semivolatile organic compound
TEF = toxic equivalency factor
TRV = toxicity reference value
VOC = volatile organic compound
WHO = World Health Organization

ATTACHMENT D
OUTFALL SAMPLING WORKSHEET

OUTFALL 22B PERFORMANCE MONITORING
SURFACE WATER AND OUTFALL SAMPLING WORKSHEET

SAMPLE LOCATION:	DATE:	START TIME:
PERSONNEL:	WEATHER:	

MEASUREMENT TYPE	VALUE/UNITS	INSTRUMENT	COMMENTS
AIR TEMP (°C)			
WATER TEMPERATURE (°C)			
SAMPLE DEPTH (TWC)			
pH			
ORP			
CONDUCTIVITY			
TURBIDITY			
FERROUS IRON			
DISSOLVED OXYGEN			
OBSERVATIONS			

ADDITIONAL COMMENTS/OBSERVATION

SAMPLE COLLECTION

SAMPLE NUMBER		QA/QC SAMPLE NO.		SAMPLE TIME:	
SAMPLE COMMENTS:					

LABORATORY (1)		COC #	
LABORATORY (2)		COC #	
LABORATORY (3)		COC #	
LABORATORY (4)		COC #	

PARAMETERS	PRESERVATION/SIZE	NUMBER/VOLUME	LABORATORY #	ICED (Y/N)	COMMENTS
Total/Dissolved Metals EPA 200.7 or EPA 200.8	1 500ml HDPE HNO3 pH<2, cool 4°C				
Total/Dissolved Mercury EPA 1631E	1 250ml HDPE HNO3 pH<2, cool 4°C				
Hexavalent Chromium EPA 7195 or EPA 7196A	1 250ml HDPE cool 4°C				
Volatile Organic Compounds (VOCs) EPA 8260C	3 40 mL Glass Vials, HCL pH<2, cool 4°C				
Semivolatile Organic Compounds (SVOCs) EPA 8270D	2 1L Amber Glass, cool 4°C				
Polycyclic Aromatic Hydrocarbons (PAHs) EPA 8270 SIM	2 1L Amber Glass, cool 4°C				
Organochlorine Pesticides EPA 1699	2 1L Amber Glass, cool 4°C				
Chlorinated Herbicides EPA 8151A	2 1L Amber Glass, cool 4°C				
PCDDs/PCDFs EPA 1613B	2 1L Amber Glass, cool 4°C				
Petroleum Hydrocarbon Identification NWTPH-HCID	1 500ml Glass, HCL pH<2, cool 4°C				
Diesel Quantitation NWTPH-Dx	1 500ml Glass, HCL pH<2, cool 4°C				
Gasoline Quantitation NWTPH-Gx	3 40ml Glass Vials, HCL pH<2, cool 4°C				

SOP-3: DECONTAMINATION PROCEDURES FOLLOWED? YES/NO:	SAMPLE METHOD USED:
QA/QC SAMPLE COLL/DESCRIBE:	SAMPLE TYPE (GRAB, SPLIT, ETC.):
CHAIN OF CUSTODY COMPLETED? YES/NO:	INSTRUMENT CALIBRATION (DATE/TIME):
WASTE DISPOSAL METHOD:	CALIBRATION STANDARD:

ADDITIONAL COMMENTS: